

CITY OF NEWTON
PURCHASING DEPARTMENT

CONTRACT FOR PUBLIC WORKS - UTILITIES DIVISION
(M.G.L. Ch. 30B)

PROJECT MANUAL:
QUINOBEQUIN PUMP STATION REPAIRS
INVITATION FOR BID #14-46

Pre-Bid Meeting: October 24, 2013 at 12:30 p.m.

Bid Opening Date: October 31, 2013 at 12:30 p.m.

OCTOBER 2013
Setti D. Warren, Mayor

CITY OF NEWTON
PURCHASING DEPARTMENT
INVITATION FOR BID

The City of Newton invites sealed bids from Contractors for

Quinobequin Road Pump Station Repairs

Pre-Bid Meeting at: 12:30 p.m., Thursday, October 24, 2013 at 136 Quinobequin Road
Bids will be received until: 12:30 p.m., Thursday, October 31, 2013
at the Purchasing Department, Room 204, Newton City Hall, 1000 Commonwealth Ave., Newton, MA 02459. Immediately following the deadline for bids all bids received within the time specified will be publicly opened and read aloud.

Contract Documents will be available online at the City's website: www.newtonma.gov/bids or for pickup at Newton City Hall, Room 204, after **10:00 a.m., October 17, 2013.**

There will be no charge for contract documents.

Once you've downloaded this bid from the internet website (www.newtonma.gov/bids) I strongly suggest you email (purchasing@newtonma.gov) your company's Name, address, EMAIL, phone, fax AND the INVITATION FOR BID NUMBER and Project Title, so that we may add you to the Bidders' List and you will be notified of any/all addendums.

All bids are subject to the provisions of M.G.L. c.30B.

Bid surety is **not** required with this bid.

Time is of the essence in the performance of the work of this contract. Bidders attention is directed to the time for completion stated in the Project Manual and the provisions regarding the assessment of liquidated damages for failure to complete the work within the time specified of **Two Hundred Ten (210) calendar days.**

The work under this contract shall consist of: BASE BID: remove and replace existing wastewater pump and motor #1 at the Quinobequin Pump Station, Newton, MA and all appurtenances as specified. ALTERNATE #1, if funding allows, remove existing starter from pump #1 install new 200-horsepower adjustable frequency drive above the existing motor control center.

All bids shall be submitted as one ORIGINAL and one COPY.

It is Bidder's responsibility to ensure its bid is submitted by the deadline for acceptance. Any bid received after the time for receipt established in this Invitation will be returned unopened.

All City of Newton bids are available on the City's web site, www.newtonma.gov/bids, Invitations for Bid. It is the sole responsibility of the contractor downloading these bids to ensure they have received any and all addenda prior to the bid opening. Addenda's will be available online within the original bid document as well as a separate file. If you download bids from the internet site and would like to make it known that your company has done so, you may fax the Purchasing Department (617) 796-1227 or email purchasing@newtonma.gov with your NAME, ADDRESS, PHONE, FAX AND INVITATION FOR BID NUMBER.

Award shall be made to lowest responsive and responsible bidder.

The City will reject any and all bids in accordance with the above referenced General Laws. In addition, the City reserves the right to waive minor informalities in any or all bids, or to reject any or all bids (in whole or in part) if it be in the public interest to do so.

CITY OF NEWTON
Nicholas Read
Chief Procurement Officer
October 17, 2013

CITY OF NEWTON
DEPARTMENT OF PURCHASING
INSTRUCTIONS TO BIDDERS

ARTICLE 1 - BIDDER'S REPRESENTATION

- 1.1 Each General Bidder (hereinafter called the "Bidder") by making a bid (hereinafter called "bid") represents that:
1. The Bidder has read and understands the Bidding Documents, Contract Forms, General Conditions, Conditions of the Contract, General Requirements and Project Specifications (collectively, referred to as the "Contract Documents") and the bid is made in accordance therewith.
 2. The Bidder has visited the work site and is familiar with the local conditions under which the work has to be performed.
- 1.2 Failure to so examine the Contract Documents and work site will not relieve any Bidder from any obligation under the bid as submitted.

ARTICLE 2 - REQUEST FOR INTERPRETATION

- 2.1 Bidders shall promptly notify the City of any ambiguity, inconsistency, or error which they may discover upon examination of the Contract Documents, the site, and local conditions.
- 2.2 Bidders requiring clarification or interpretation of the Contract Documents shall make a written request to the *Chief Procurement Officer*, at purchasing@newtonma.gov or via facsimile (617) 796-1227. The City will only answer such requests if received by Friday, **October 25, 2013 at 12:00 noon**.
- 2.3 Interpretation, correction, or change in the Contract Documents will be made by addendum which will become part of the Contract Documents. The City will not be held accountable for any oral communication.
- 2.4 Addenda will be emailed to every individual or firm on record as having taken a set of Contract Documents.
- 2.5 Copies of addenda will be made available for inspection at the location listed in the Invitation for Bids where Contract Documents are on file, in addition to being available online at www.newtonma.gov/bids.
- 2.6 Bidders or proposers contacting ANY CITY EMPLOYEE regarding an Invitation for Bid (IFB) or a Request for Proposal (RFP), outside of the Purchasing Department, once an IFB or RFP has been released, may be disqualified from the procurement process.
- 2.7 Bidders downloading information off the internet web site are solely responsible for obtaining any addenda prior to the bid opening. If the bidder makes itself known to the Purchasing Department, at purchasing@newtonma.gov or via facsimile (617) 796-1227, it shall be placed on the bidder's list. Bidders must provide the Purchasing Department with their company's name, street address, city, state, zip, phone, fax, email address and **INVITATION FOR BID #14-46**.

ARTICLE 3 - MBE PARTICIPATION

- 3.1 Notice is hereby given that the Mayor's Affirmative Action Plan for the City of Newton in effect at the time of this solicitation is applicable to all construction contracts in excess of \$10,000.00.
- 3.2 Notice is hereby given that the City of Newton Minority/Women Business Enterprise Plan and the Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program in effect at the time of this solicitation are applicable to all City contracts for goods and services in excess of \$50,000.00.
- 3.3 Copies of the Plans and Program referred to in Sections 3.1 and 3.2 are available at: www.newtonma.gov/purchasing.

ARTICLE 4 - PREPARATION AND SUBMISSION OF BIDS

- 4.1 Bids shall be submitted on the "Bid Form" as appropriate, furnished by the City.
- 4.2 All entries on the Bid Form shall be made by typewriter or in ink.
- 4.3 Where so indicated on the Bid Form, sums shall be expressed in both words and figures. Where there is a discrepancy between the bid sum expressed in words and the bid sum expressed in figures, the words shall control.
- 4.4 The Bid, including the bid deposit shall be enclosed in a sealed envelope with the following plainly marked on the outside:
- * GENERAL BID FOR: **#14-46**
 - * NAME OF PROJECT: **Quinobequin Pum Station Repairs**
 - * BIDDER'S NAME, BUSINESS ADDRESS, AND PHONE NUMBER
- 4.5 Date and time for receipt of bids is set forth in the Invitation for Bids.
- 4.6 Timely delivery of a bid at the location designated shall be the full responsibility of the Bidder. In the event that Newton City Hall is closed on the date or at the time that bids are due, the date and time for receipt of bids shall be on the next business day following that the Newton City Hall and the Purchasing Department are open.
- 4.7 Bids shall be submitted with one **original** and one **copy**.
- 4.8 Be advised that a new Massachusetts law has been enacted that required all employees who work on Massachusetts public works construction sites must have no less than 10 hours of OSHA-approved safety and health training. See Chapter 306 of the Acts of 2004, which became effective July 1, 2006.
1. This requirement will apply to any general bid or sub bid submitted.
 2. This law directs the Massachusetts Attorney General to restrain the award of construction contracts to any contractor who is in violation to this requirement and to restrain the performance of these contracts by non-complying contractors.
 3. The contractor and all subcontractors on this project will be required to provide certification of compliance with this requirement. Non-compliance with this law will disqualify you from bidding on public contracts.

ARTICLE 5 - ALTERNATES

- 5.1 Each Bidder shall acknowledge alternates (if any) in Section C on the Bid Form.
- 5.2 In the event an alternate does not involve a change in the amount of the base bid, the Bidder shall so indicated by writing "No Change", or "N/C" or "0" in the space provided for that alternate.
- 5.3 Bidders shall enter on the Bid Form a single amount for each alternate which shall consist of the amount for work performed by the Contractor.
- 5.4 The low Bidder will be determined on the basis of the sum of the base bid and the accepted alternates.

ARTICLE 6 - WITHDRAWAL OF BIDS

- 6.1 Any bid may be withdrawn prior to the time designated for receipt of bids on written or electronic request. Electronic withdrawal of bids must be confirmed over the Bidder's signature by written notice postmarked on or before the date and time set for receipt of bids.
- 6.2 Withdrawn bids may be resubmitted up to the time designated for the receipt of bids.
- 6.3 No bids may be withdrawn within sixty (60) days, Saturdays, Sundays and legal holidays excluded, after the opening of the bids.

ARTICLE 7 - CONTRACT AWARD

- 7.1 The City will award the contract to the lowest responsible and eligible Bidder within sixty (60) days, Saturdays, Sundays, and legal holidays excluded, after the opening of bids.
- 7.2 The City reserves the right to waive minor informalities in or to reject any or all Bids if it be in the public interest to do so.
- 7.3 The City reserves the right to reject any bidder who has failed to pay any local taxes, fees, assessments, betterments, or any other municipal charge, unless the bidder has a pending abatement application or has entered into a payment agreement with the collector-treasurer.
- 7.4 As used herein, the term "lowest responsible and eligible Bidder" shall mean the Bidder (1) whose bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work; (2) who has met all the requirements of the invitation for bids; (3) who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (4) who, where the provisions of section eight B of chapter twenty-nine apply, shall have been determined to be qualified thereunder.
- 7.5 Subsequent to the award and within five (5) days, Saturday, Sundays and legal holidays excluded, after the prescribed forms are presented for signature, the successful Bidder shall execute and deliver to the City a contract in the form included in the Contract Documents in such number of counterparts as the City may require.
- 7.6 In the event that the City receives low bids in identical amount from two or more responsive and responsible Bidders, the City shall select the successful Bidder by a blind selection process chosen by the City such as flipping a coin or drawing names from a hat. The low Bidders who are under consideration will be invited to attend and observe the selection process.

ARTICLE 8 - TAXES

- 8.1 The Bidder shall not include in this bid any tax imposed upon the sale or rental of tangible personal property in this Commonwealth, such as any and all building materials, supplies, services and equipment required to complete the work.
- 8.2 The City is exempt from payment of the Massachusetts Sales Tax, and the Bidder shall not include any sales tax on its bid. The City's exemption Number is E-046-001-404.

END OF SECTION

CITY OF NEWTON
DEPARTMENT OF PURCHASING
GENERAL BID FORM #14-46

TO THE AWARDING AUTHORITY:

A. The undersigned proposes to furnish all labor and materials required for

Quinobequin Pump Station Repairs

in Newton, Massachusetts in accordance with the accompanying plans and specifications prepared by the City of Newton for the contract price specified below, subject to additions and deductions according to the terms of the specifications.

B. This bid includes addenda number(s) _____, _____, _____, _____,

C. The proposed contract price is:

BASE BID: Remove and replace existing wastewater pump and motor #1 and all appurtenances as specified at the Quinobequin Pump Station, Newton, MA.

_____ DOLLARS (\$ _____).

ALTERNATE #1: Remove existing starter from pump #1 install new 200-horsepower adjustable frequency drive above the existing motor control center.

_____ DOLLARS (\$ _____).

COMPANY: _____

D. The undersigned has completed and submits herewith the following documents:

- ☐ Signed Bid Form, 2 pages
- ☐ Bidder's Qualifications and References Form , 2 pages
- ☐ Certificate of Non-Collusion, 1 page
- ☐ Debarment Letter, 1 page
- ☐ IRS Form W-9, 1 page

- E. Prompt Payment Discounts. Bidders are encouraged to offer discounts in exchange for an expedited payment. Payments may be issued earlier than the general goal of within 30 days of receipt of the invoice only when in exchange for discounted prices. Discounts will not be considered in determining the lowest responsible bidder.

Prompt Payment Discount _____ % _____ Days
Prompt Payment Discount _____ % _____ Days
Prompt Payment Discount _____ % _____ Days

- F. The undersigned agrees that, if s/he is selected as general contractor, s/he will within five days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the awarding authority, execute a contract in accordance with the terms of this bid and furnish a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority and each in the sum of the contract price, the premiums for which are to be paid by the general contractor and are included in the contract price.

The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that s/he will comply fully with all laws and regulations applicable to awards made subject to section forty-four A of M.G.L. Chapter 30, s 39M.

The undersigned certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (2) that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration ("OSHA") that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and (3) that all employees to be employed in the work subject to this bid have successfully completed a course in construction safety and health approved by the United States OSHA that is at least 10 hours in duration. The undersigned understands that any employee found on a worksite subject to this section without documentation of successful completion of a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration shall be subject to immediate removal.

The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

Date _____

(Name of General Bidder)

BY: _____
(Signature)

(Printed Name and Title of Signatory)

(Business Address)

(City, State Zip)

(Telephone)

(FAX)

(E-mail)

NOTE: If the bidder is a corporation, indicate state of incorporation under signature, and affix corporate seal; if a partnership, give full names and residential addresses of all partners; and if an individual, give residential address if different from business address.

END OF SECTION

CITY OF NEWTON

BIDDER'S QUALIFICATIONS AND REFERENCES FORM

All questions must be answered, and the data given must be clear and comprehensive. Please type or print legibly. If necessary, add additional sheet for starred items. This information will be utilized by the City of Newton for purposes of determining bidder responsiveness and responsibility with regard to the requirements and specifications of the Contract.

1. FIRM NAME: _____
2. WHEN ORGANIZED: _____
3. INCORPORATED? _____ YES _____ NO DATE AND STATE OF INCORPORATION: _____
4. IS YOUR BUSINESS A **MBE**? _____ YES _____ NO **WBE**? _____ YES _____ NO or **MWBE**? _____ YES _____ NO
- * 5. LIST ALL CONTRACTS CURRENTLY ON HAND, SHOWING CONTRACT AMOUNT AND ANTICIPATED DATE OF COMPLETION:

- * 6. HAVE YOU EVER FAILED TO COMPLETE A CONTRACT AWARDED TO YOU?
_____ YES _____ NO
IF YES, WHERE AND WHY?

- * 7. HAVE YOU EVER DEFAULTED ON A CONTRACT? _____ YES _____ NO
IF YES, PROVIDE DETAILS.

- * 8. LIST YOUR VEHICLES/EQUIPMENT AVAILABLE FOR THIS CONTRACT:

- * 9. IN THE SPACES FOLLOWING, PROVIDE INFORMATION REGARDING CONTRACTS COMPLETED BY YOUR FIRM SIMILAR IN NATURE TO THE PROJECT BEING BID. A MINIMUM OF FOUR (4) CONTRACTS SHALL BE LISTED. PUBLICLY BID CONTRACTS ARE PREFERRED, BUT NOT MANDATORY.

PROJECT NAME: _____
OWNER: _____
CITY/STATE: _____

DOLLAR AMOUNT: \$ _____ DATE COMPLETED: _____
PUBLICLY BID? _____ YES _____ NO
TYPE OF WORK?: _____
CONTACT PERSON: _____ TELEPHONE #: (____) _____
CONTACT PERSON'S RELATION TO PROJECT?: _____
(i.e., contract manager, purchasing agent, etc.)

PROJECT NAME: _____
OWNER: _____
CITY/STATE: _____
DOLLAR AMOUNT: \$ _____ DATE COMPLETED: _____
PUBLICLY BID? _____ YES _____ NO
TYPE OF WORK?: _____
CONTACT PERSON: _____ TELEPHONE #: (____) _____
CONTACT PERSON'S RELATION TO PROJECT?: _____
(i.e., contract manager, purchasing agent, etc.)

PROJECT NAME: _____
OWNER: _____
CITY/STATE: _____
DOLLAR AMOUNT: \$ _____ DATE COMPLETED: _____
PUBLICLY BID? _____ YES _____ NO
TYPE OF WORK?: _____
CONTACT PERSON: _____ TELEPHONE #: (____) _____
CONTACT PERSON'S RELATION TO PROJECT?: _____
(i.e., contract manager, purchasing agent, etc.)

PROJECT NAME: _____
OWNER: _____
CITY/STATE: _____
DOLLAR AMOUNT: \$ _____ DATE COMPLETED: _____
PUBLICLY BID? _____ YES _____ NO
TYPE OF WORK?: _____
CONTACT PERSON: _____ TELEPHONE #: (____) _____
CONTACT PERSON'S RELATION TO PROJECT?: _____
(i.e., contract manager, purchasing agent, etc.)

10. The undersigned certifies that the information contained herein is complete and accurate and hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the City of Newton in verification of the recitals comprising this statement of Bidder's qualifications and experience.

DATE: _____ BIDDER: _____

SIGNATURE: _____

PRINTED NAME: _____ TITLE: _____

END OF SECTION

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word “person” shall mean any natural person, business, partnership, corporation, union, committee club, or other organization, entity, or group or individuals.

(Signature of individual)

Name of Business

City of Newton



Mayor
Setti D. Warren

Purchasing Department
Nicholas Read @ *Chief Procurement Officer*
1000 Commonwealth Avenue
Newton Centre, MA 02459-1449
purchasing@newtonma.gov

Telephone
(617) 796-1220
Fax:
(617) 796-1227
TDD/TTY
(617) 796-1089

Date

Vendor

Re: Debarment Letter for Invitation For Bid # _____

As a potential vendor on the above contract, the City requires that you provide a debarment/suspension certification indicating that you are in compliance with the below Federal Executive Order. Certification can be done by completing and signing this form.

Debarment:

Federal Executive Order (E.O.) 12549 "Debarment and Suspension" requires that all contractors receiving individual awards, using federal funds, and all sub-recipients certify that the organization and its principals are not debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency from doing business with the Federal Government.

I hereby certify under pains and penalties of perjury that neither I nor any principal(s) of the Company identified below is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department or agency.

(Name)

(Company)

(Address)

(Address)
PHONE _____ FAX _____
EMAIL _____

Signature

Date

If you have questions, please contact Nicholas Read, Chief Procurement Officer at (617) 796-1220.

**Request for Taxpayer
Identification Number and Certification**

Give form to the
requester. Do not
send to the IRS.

Print or type
See Specific Instructions on page 2.

Name (as shown on your income tax return)

Business name, if different from above

Check appropriate box: ☐ Individual/Sole proprietor ☐ Corporation ☐ Partnership
☐ Limited liability company. Enter the tax classification (D=disregarded entity, C=corporation, P=partnership) ▶
☐ Other (see instructions) ▶

X Exempt
payee

Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

City, state, and ZIP code

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on Line 1 to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Social security number

or

Employer identification number

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the Certification, but you must provide your correct TIN. See the instructions on page 4.

**Sign
Here**

Signature of
U.S. person ▶

Date ▶ Name

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

The person who gives Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States is in the following cases:

- The U.S. owner of a disregarded entity and not the entity,

CONTRACT FORMS

The awarded bidder will be required to complete and submit documents substantially similar in form to the following.

These forms may need to be modified on account of changed circumstances, and are provided for informational purposes only.

CITY-CONTRACTOR AGREEMENT

CONTRACT NO. C-

THIS AGREEMENT made this _____ day of _____ in the year Two Thousand and Thirteen by and between the CITY OF NEWTON, a municipal corporation organized and existing under the laws of the Commonwealth of Massachusetts, hereinafter referred to as the CITY, acting through its Chief Procurement Officer, but without personal liability to him, and

hereinafter referred to as the CONTRACTOR.

The parties hereto for the consideration hereinafter set forth agree as follows:

ARTICLE 1. STATEMENT OF WORK. The Contractor shall furnish all labor, materials, and equipment and perform all work required in strict accordance with the Contract Documents for the following project:

QUINOBEQUIN PUMP STATION REPAIRS

Base Bid

Alternate #1

ARTICLE 2. TIME OF COMPLETION. The Contractor shall commence work under this Contract on the date specified in the written notice of the City to proceed and shall fully complete all work hereunder within the time specified in the Summary of Work and Specific Work Requirements of the Project Manual. Time is of the essence with regard to this contract. Failure to complete within the time specified shall be subject to the assessment of liquidated damages in accordance with the provisions contained in the Project Manual.

ARTICLE 3. THE CONTRACT PRICE. The City shall pay the Contractor for the full and satisfactory performance of the Contract a sum not to exceed:

ARTICLE 4. CONTRACT DOCUMENTS. The Contract Documents consist of the following documents which are either attached to this Agreement or are incorporated herein by reference:

- a. This CITY-CONTRACTOR Agreement;
- b. The City's Invitation For Bid #14-46 issued by the Purchasing Department;
- c. The Project Manual for QUINOBEQUIN PUMP STATION REPAIRS including the Instructions to Bidders; General Conditions; Special Conditions; MWBE/AA Requirements, Wage Rate Requirements and Wage Rate Schedule(s) including any updated prevailing wage rate schedules if applicable; The Supplementary Special Conditions; General Requirements and Project Specifications; and Drawings, if included or referenced therein;
- d. Addenda Number(s)_____ ;
- e. The Bid Response of the CONTRACTOR submitted for this Project and accompanying documents and certifications;

- f. Certificate(s) of Insurance and surety bond(s) submitted by the CONTRACTOR in connection with this Project;
- g. Duly authorized and executed Amendments, Change Orders or Work Orders issued by the CITY after execution of this CITY-CONTRACTOR Agreement.

This CITY-CONTRACTOR Agreement, together with the other documents enumerated in this Article, constitute the entire Agreement between the CITY and the CONTRACTOR.

ARTICLE 5. ALTERNATES. The following Alternates have been accepted and their costs are included in the Contract Price stated in Article 3 of this Agreement:

Alternates: _____

ARTICLE 6. APPLICABLE STATUTES. All applicable federal, state and local laws and regulations are incorporated herein by reference and the Contractor agrees to comply with same.

IN WITNESS WHEREOF, the parties have caused this instrument to be executed under seal the day and year first above written.

CONTRACTOR

By _____

Print Name _____

Title _____

Date _____

Affix Corporate Seal here

City funds in the amount of \$90,000.00
are available in account number:

R27A401Y3-586010

I further certify that the Mayor, or his designee,
is authorized to execute contracts and approve
change orders.

By _____

Comptroller of Accounts

Date _____

CITY OF NEWTON

By _____

Chief Procurement Officer

Date _____

By _____

Commissioner of Public Works

Date _____

Approved as to Legal Form and Character

By _____

Associate City Solicitor

Date _____

CONTRACT AND BONDS APPROVED

By _____

Mayor or his designee

Date _____

CERTIFICATE OF AUTHORITY - CORPORATE

1. I hereby certify that I am the Clerk/Secretary of _____
(insert full name of Corporation)

2. Corporation, and that _____
(insert the name of officer who signed the **contract and bonds.**)

3. is the duly elected _____
(insert the title of the officer in line 2)

4. of said corporation, and that on _____
(insert a date that is ***ON OR BEFORE*** the date the officer signed the **contract and bonds.**)

at a duly authorized meeting of the Board of Directors of said corporation, at which all the directors were present or waived notice, it was voted that

5. _____ the _____
(insert **name** from line 2) (insert **title** from line 3)

of this corporation be and hereby is authorized to execute contracts and bonds in the name and on behalf of said corporation, and affix its Corporate Seal thereto, and such execution of any contract of obligation in this corporation's name and on its behalf, with or without the Corporate Seal, shall be valid and binding upon this corporation; and that the above vote has not been amended or rescinded and remains in full force and effect as of the date set forth below.

6. ATTEST: _____ *AFFIX CORPORATE*
(Signature of **Clerk or Secretary**)* *SEAL HERE*

7. Name: _____
(Please print or type name in line 6)*

8. Date: _____
(insert a date that is ***ON OR AFTER*** the date the officer signed the **contract and bonds.**)

* The name and signature inserted in lines 6 & 7 **must** be that of the **Clerk or Secretary** of the corporation.

CERTIFICATION OF TAX COMPLIANCE

Pursuant to M.G.L. c.62C, §49A and requirements of the City, the undersigned acting on behalf of the Contractor certifies under the penalties of perjury that the Contractor is in compliance with all laws of the Commonwealth relating to taxes including payment of all local taxes, fees, assessments, betterments and any other local or municipal charges (unless the Contractor has a pending abatement application or has entered into a payment agreement with the entity to which such charges were owed), reporting of employees and contractors, and withholding and remitting child support.*

**Signature of Individual
or Corporate Contractor (Mandatory)

*** Contractor's Social Security Number
(Voluntary) or Federal Identification Number

Print Name:_____

By: _____
Corporate Officer
(Mandatory, if applicable)

Date: _____

Print Name:_____

* The provision in this Certification relating to child support applies only when the Contractor is an individual.

** Approval of a contract or other agreement will not be granted until the City receives a signed copy of this Certification.

*** Your social security number may be furnished to the Massachusetts Department of Revenue to determine whether you have met tax filing or tax payment obligations. Providers who fail to correct their non-filing or delinquency will not have a contract or other agreement issued, renewed, or extended.

GENERAL CONDITIONS
OF THE CONTRACT
FOR NON-TECHNICAL SERVICES

The City of Newton, herein referred to as the City, does hereby establish the following General Conditions, applicable to this Invitation for Bids and any subsequent purchase order, work order, shipping order or contract resulting therefrom.

1.0 SCOPE OF SERVICES

- 1.1 The Contractor agrees to furnish all labor, materials, equipment and insurance necessary to perform and fully complete, in every respect, within the time frame herein specified, all work (hereinafter referred as the Services) described in the Project Manual.
- 1.2 The Contractor shall not make any changes in the scope of Services without the prior written consent of the City. The Contractor shall make reasonable revisions or corrections, within the scope of Services, to any work performed until submitted in a form acceptable to the City.
- 1.3 The City reserves the right to alter, add to or reduce the Services by delivering to the Contractor written notice specifying the nature and extent of such alteration, addition or reduction. Such notice shall be effective upon the later of actual receipt by the Contractor or upon the date given in such notice. No addition to the Services shall be made unless the City and the Contractor have agreed to such increase in writing.

2.0 CONTRACT TERM

- 2.1 The obligations of the Contractor identified herein shall commence upon execution of the City-Contractor Contract and shall continue in full force and effect for the duration of the contract term as identified in the Project Manual. The contractor shall commence the performance of services under this contract promptly upon receipt of the City's Notice to Proceed in accordance with the provisions identified in the Project Manual.
- 2.2 In the event the term of this contract exceeds a period of one year and notwithstanding any provision to the contrary herein, the City shall cancel this contract in the event that funds are not appropriated or otherwise made available to support continuation of performance by the Contractor in any fiscal year succeeding the first year.

3.0 EXECUTION

- 3.1 All work required hereunder shall be performed as promptly as possible, and in any event within the time herein set forth, and such work shall be subject to approval and acceptance by the City, but such approval and acceptance shall not relieve the Contractor from the obligation to correct any incomplete, inaccurate or defective work, all of which shall be promptly remedied by the Contractor on demand, without cost to the City. The Contractor shall obtain all the required licenses and permits for the work herein described.
- 3.2 The Contractor shall conform to all determinations and directions of the City concerning the Contractor's delivery of services in the event of inclement weather, equipment failure, picket lines on City property, or labor strikes by the contractor's employees.

4.0 COMPENSATION

- 4.1 The City shall pay the Contractor for services rendered under this contract in accordance with the amount(s) set forth in the Contractor's General Bid Form and pursuant to the provisions contained in the Project Manual.
- 4.2 Notwithstanding anything to the contrary contained in the Contract, the City may withhold any payment to the Contractor hereunder if and for so long as the Contractor fails to perform any of its obligations hereunder or otherwise is in default under this Contract including, without limitation, any failure to perform Services in full accordance with the amount sufficient in the reasonable opinion of the City to cure any such default or failure of performance by the Contractor.

4.3 In no event shall the City be required to pay any amounts for work deemed by it to be unacceptable, or which are otherwise disputed. In the event the City disputes any such amounts invoiced, it shall pay all amounts not in dispute and notify the Contractor in writing of the amounts disputed and the reasons therefor.

4.4 No payment made shall constitute or be construed as final acceptance or approval of that part of the Services to which payment relates, or relieve the Contractor of any of its obligations outlined in this Contract. Further, the City shall not be deemed, by virtue of making payments to the Contractor hereunder, to have released the Contractor from any claim or liability, or to have waived any action arising out of the breach of this Contract by the Contractor.

5.0 REPORTS AND DRAWINGS

When the Contractor has been paid for the Services performed by him or her, all reports, drawings, and other material furnished to the City shall become the City's property and may be used by the City (or such parties as the City may designate) thereafter in such manner and for such purposes as the City (or such parties as the City may designate) may deem advisable, without further employment of or additional compensation to the Contractor. The Contractor shall not release or disclose any report, drawing, or other material furnished to the Contractor by the City in connection with the performance of the Contractor's Services

6.0 CONTRACTOR'S ACCOUNTING RECORDS

The Contractor shall keep records pertaining to Services performed (including complete and detailed time records) on the basis of recognized bookkeeping practices, generally accepted accounting principles, and in accordance with such reasonable requirements to facilitate audit as the City may provide. All records shall be available to the City or its authorized representatives for review and audit during normal business hours.

7.0 ASSIGNMENT/SUBCONTRACTING

The Contractor agrees that he will not sell, assign or transfer this Contract or any part thereof or interest therein without the prior written consent of the City.

8.0 REMEDY FOR DEFAULT

If the Contractor, in the sole judgment of the City, shall violate or fail properly to comply with or perform in any material respect any condition, provision, or warranty hereof, the City shall have the right by prior written notice to the Contractor to have the services called for hereby otherwise performed, and/or to terminate this contract without prejudice to any other rights or remedies of the City under this contract. The Contractor shall pay any excess in the City's cost to so procure the services and any related goods, supplies, materials or equipment. In addition, and without limiting any other remedies available to the City, the Contractor shall be liable for all losses, costs and expenses incurred by the City which result from the Contractor's noncompliance.

9.0 SUSPENSION OR TERMINATION

9.1 The City shall have the right, upon seven (7) days written notice to the Contractor so stating, to terminate, suspend, or postpone this contract in whole or in part for any reason deemed by the City to be in the public interest. Any such termination, suspension, or postponement shall not give rise to any cause of action for damages against the City. In the event that the City postpones or suspends the Services, the Contractor's time for performance of the Services shall be extended for a period equal to the period of such postponement or suspension. In the event of termination, suspension or postponement, the City shall pay: (a) for services and any related goods, supplies, materials and equipment furnished up to the time of termination, suspension, or postponement at the contract price upon delivery; (b) for work in process in the amount of the Contractor's cost, determined in accordance with ordinary accepted accounting practices, up to the time of termination, suspension, or postponement; and (c) for raw materials purchased by the Contractor as of the date of termination, suspension, or postponement and which are noncancelable at the Contractor's actual cost plus reasonable handling charges, but only to the extent that such raw materials were purchased in reliance upon this contract and are useful solely with respect to this contract.

9.2 Upon receipt of a notice of termination, suspension, or postponement the Contractor shall immediately cease all work hereunder and cancel all orders placed with respect to this contract. The Contractor's failure to so cancel shall relieve the City of the obligations of paragraph 10.1 above.

- 9.3 The City may postpone, suspend or terminate the Services immediately, by notice, hand delivery or certified mail, if the Contractor violates any of the provisions of this Contract, or fails to perform or observe any of the terms, covenants or conditions of this Contract, or abandons in whole or in part its Services, or becomes unable to perform its Services.
- 9.4 In the event of termination of this Contract, the Contractor shall promptly deliver to the City all documents, work papers, calculations, computer programs, data, drawings, plans, and other tangible work product, or materials pertaining to the Services performed under this Contract to the time of termination.

10.0 NOTICE

Any action, notice or request required to be taken, given or made by City or the Contractor hereunder may be taken, given or made only by those persons identified for that purpose on the Contract Form. All notices required to be given hereunder shall be deemed properly given if personally delivered, or if mailed by registered or certified mail, postage prepaid addressed to the address and officer identified on the Contract Form.

11.0 PROTECTION OF PROPERTY

The Contractor shall take all reasonable precautions to prevent damage to property, visible and concealed, and shall restore to substantially the same condition existing prior to the Contractor's entry any disturbance or damage to property caused by the Contractor or any person acting under its control.

12.0 INSURANCE REQUIREMENTS

- 12.1 The Contractor shall provide insurance coverage as listed below. This insurance shall be provided at the Contractor's expense and shall be in full force and effect during the full term of this Contract.

WORKER'S COMPENSATION

Worker's Compensation: Per M.G.L. c.149, §34 and c.152 as amended.

PUBLIC LIABILITY

Personal Injury	\$500,000 each occurrence \$1,000,000 aggregate
Property Damage	\$500,000 each occurrence \$1,000,000 aggregate

VEHICLE LIABILITY

Personal Injury	\$500,000 each person \$1,000,000 aggregate
Property Damage	\$300,000 each occurrence \$500,000 aggregate

- 12.2 The City shall be named as additional insureds on the Contractor's Liability Policies.
- 12.3 The Contractor shall not commence the work until proof of compliance with this Section 12.0 has been furnished to the City by submitting one copy of a properly endorsed insurance certificate issued by a company authorized to write insurance in the Commonwealth. This certificate shall indicate that the contractual liability coverage is in force.
- 12.4 The Contractor shall file the original and one certified copy of all policies with the City within fifteen (15) days after contract award. If the City is damaged by the Contractor's failure to maintain such insurance and to so notify the City, then the Contractor shall be responsible for all reasonable costs attributable thereto.
- 12.5 Cancellation of any insurance required by this contract, whether by the insurer or the insured, shall not be valid unless written notice thereof is given by the party proposing cancellation to the other party and City at least thirty days prior to the effective date thereof, which shall be expressed in said notice.

13.0 CONFLICT OF INTEREST

No member, agent or employee of the City shall , during his/her tenure or one year thereafter directly or indirectly, have any interest in any property to be included in, or any contract for property, materials or services to be furnished or used in connection with, this contract or the proceeds thereof.

14.0 COMPLIANCE WITH LAWS

All work to be performed and wages paid under this specification shall be in accordance with all applicable laws, state or federal, and all applicable ordinances, codes, rules, and regulations of the City of Newton, or any public board or office having any jurisdiction, regulation or control over any work to be done hereunder, including minimum wage rates. In particular, without limitation, the Contractor agrees to comply with all regulations pertaining to approvals for federal and state grants, and with all federal and state environmental laws and regulations. The Contractor agrees to assist in making any submissions to federal or state agencies as may be required in order to meet the requirements in this paragraph.

15.0 INDEMNIFICATION

The Contractor agrees to indemnify and save the City harmless from and against any and all costs, losses, expenses, liabilities, damages or claims for damages, including reasonable attorney's fees and expenses, on account of any injury or damage to buildings, improvements, or property of the City or on account of any injury (including death) or damage to any person, persons, firm, corporation or association, or on account of any infringement or claim of infringement of patents, arising out of or resulting from the deliveries provided for or performed under this contract or from any act, omission or negligence of the contractor, his agents, employees, or assigns. The foregoing provisions shall not be deemed to be released, waived or modified in any respect by reason of any surety or insurance provided by the contractor under contract.

16.0 FORCE MAJEURE

The City may not hold the Contractor liable for any loss, expense or damage incurred by the City on account of failure of the Contractor to deliver services as specified herein, if that failure is caused by state of war, acts of enemies, expropriation or confiscation of facilities used by the Contractor, or compliance with any law, order, or regulation of any federal, state or municipal governmental authority, if the Contractor shall show that such compliance would impair this ability to perform a material provision of this contract, the Contractor having given the City reasonable notice of such cause.

17.0 DISPUTES

All claims, disputes and other matters in question between the City and the Contractor arising out of or relating to this Contract or the breach of it, shall be submitted for resolution to a court of competent jurisdiction in Massachusetts, unless otherwise agreed by the parties. No such action shall be brought, however, until the completion of all Services under this Contract or the earlier termination of this Contract as provided herein, the parties agreeing to negotiate any claims, disputes or other matters in question during the term of this Contract before resorting to litigation. As to all acts or failures to act by either party to this Contract, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events when the other party becomes aware or should have been aware of such acts or failure to act.

18.0 GOVERNING LAW

This contract shall be governed by and construed in accordance with Massachusetts Law.

19.0 LIABILITY

The Contractor is retained solely for the purpose of and to the extent set forth in this Contract. The Contractor's relationship to the City for the purpose of services to be performed under this Contract shall be that of an independent contractor. The Contractor shall have no capacity or authority to involve the City in any contract or to incur any liability on behalf of the City. In no event shall the City be held liable as an employer or otherwise for any personal injury to or

death of the Contractor's principals, employees, agents and/or representatives occasioned by or resulting from the Contractor's performance under this Contract.

20.0 LIENS

The Contractor shall cause to be removed from the property of the City any liens or other claims asserted by any person or entity claiming through or under the Contractor and arising out of Services performed under this Contract by such third party.

21.0 SEVERABILITY

In the event that any portion of this Contract is held illegal or unenforceable by a court of competent jurisdiction, the parties agree that such invalidity shall not affect the validity of the remaining portions of this Contract and Contractor and the City agree to substitute for the invalid provision a valid provision which most closely approximates the economics and intent of the invalid provision.

END OF SECTION

PUMP STATION REPAIRS
QUINOBEQUIN PUMP STATION
SPECIAL CONDITIONS

1.0 PROJECT SITE

- A. The area of work shall be the Quinobequin Pump Station, 136 Quinobequin Road, Newton, MA.

2.0 TIME FOR COMPLETION

- A. The work shall be commenced at the time stipulated in the Notice to Proceed to the Contractor. All work with shall be fully complete within two hundred ten (210) calendar days from the stipulated date.

3.0 PAYMENT

- A. Payment to the Contractor shall be made in accordance with the provisions of Paragraph 2.6 of the General Conditions. The amount of retainage established for this contract shall be 5%.

4.0 LIQUIDATED DAMAGES

- A. As actual damages for any delay in completion are impossible to determine, the Contractor and his/her sureties shall be liable for and shall pay fifty dollars (\$50.00) as fixed, and agreed liquidated damages for each calendar day of delay beyond the completion date stated in the Notice to Proceed until the work is brought to full and accepted completion.

5.0 COMMUNICATIONS

- A. All notices, demands, requests, instructions, approvals and claims must be in writing.
- B. Any such notice shall be deemed to have been given as of the time of delivery, or of actual receipt in the case of telegrams or, in the case of mailing, when it should have been received in due course of post.
- C. For communicating purposes, the office address of the Contractor shall be that stated on the signature page of the contract; that of the City shall be as stated in the Notice to Contractors. Any subsequent change in address of either party shall be communicated to the other in writing.

6.0 PLANS AND SPECIFICATIONS

- A. The City will furnish to the Contractor, without charge, all copies of the specifications reasonably necessary in the performance of the contract work.

7.0 COORDINATION

The Contractor shall:

- A. Supply to the City the name and telephone number of a responsible person who may be contacted during off-hour emergencies on the project.
- B. Cooperate at all times with the City and the Project Manager, and ensure the cooperation of his key personnel and that of his subcontractors.
- C. Provide 24 hour minimum notice to building management to prepare for access to any site area.

8.0 CONDUCT OF THE WORK

- A. The work must be completed in a continuous uninterrupted operation. The Contractor must use sufficient men and adequate equipment to complete all the necessary work requirements within a minimum period of time.
- B. The work shall be conducted between the hours of 8:00 a.m. and 4:30 p.m. on Monday through Friday. No work shall be done on holidays, Saturdays or Sundays other than for emergencies, or unless specifically authorized by the City.
- C. The Contractor is responsible for the security of partially completed work until the project is finally accepted by the City.

9.0 ALTERATION

- A. The Contractor shall patch, repair and/or replace all existing materials and surfaces remaining exposed after installation of new work which have been affected by alteration or removal of existing work. All patch and repair work shall match existing.

10.0 GENERAL DIRECTIONS

- A. Damage to Persons and Property

Any damage to buildings, roads, public roads, bituminous concrete areas, fences, lawn areas, trees, shrubbery, electric or telephone poles, underground utilities, etc., shall be repaired by the Contractor at his own expense. Damaged property shall be returned to its original condition prior to the damages within a reasonable time period, except all utility outages shall be repaired immediately.

- B. Protection of Persons and Property

The Contractor shall, at all times, leave an unobstructed way along the roadways and walks, and shall maintain barriers and lights for the protection of all persons and property in all locations where he has materials stored or work going on, and during the entire time such work is going on or material is stored.

- C. The Contractor shall at the end of each work day leave the fields in usable condition. There shall be no open holes/trenches or exposed irrigation heads that could pose a trip hazard or potential injury to persons using the fields.

- D. Care of Work

All work is to be carefully protected so that no injury will come to it from water, frost, accident, or any other cause and any injury which may come to any of the work shall be repaired immediately by the Contractor at his own expense and without additional cost to the City. This shall also apply to any abutting or adjoining work on premises. The Contractor shall be responsible for any damage and in the event of such damage, the Contractor shall repair the damage immediately at his own cost and without additional cost to the City.

- E. Removal of Debris

Debris of any nature shall be completely removed from the site at the end of each days work and disposed of in accordance with all Federal, State and local regulations.

- F. The Contractor is responsible for the security of all work until it is accepted by the City.

11.0 DELETED

12.0 SUBMISSION OF PAYROLLS

- A. The Contractor shall, with each monthly invoice submitted during the term of this Contract, submit to the City two (2) legible copies of his payrolls documenting the wages paid to all employees performing on site labor relating to the work of this Contract. These copies shall be prepared on forms supplied by the City.

13.0 DRAWINGS

- A. The drawings attached herein and such drawings as may be issued per addendum, shall constitute an integral part of this section and shall serve as the working drawings.
- B. Drawings shall not be scaled. Field verification is directed since actual locations, dimensions and levels are existing.
- C. All items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation, shall be included.

14.0 MATERIALS

- A. Unless specifically so stated to the contrary the use of a manufacturer's name or style number is not restrictive, and is intended solely as an identification of the type and quality of the materials and services required. In all cases, the words "or approved equal" if not inserted are implied.
- B. An item equal to that named or described in the specifications may upon written approval of the City be furnished by the Contractor. An item shall be considered equal to the item so named or described if (1) it is at least equal in quality, durability, appearance, strength and design; (2) it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased; (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the specifications.
- C. The name and identification of all materials other than the one specifically named shall be submitted to the City in writing for approval, prior to purchase, use or fabrication of such items. Subject to the provisions of M.G.L. Ch. 30, Sec. 39J, approval shall be at the sole discretion of the City, shall be in writing to be effective, and the decision of the City shall be final. The City may require tests of all materials so submitted to establish quality standards at the Contractor's expense.
- D. For the use of material other than the one specified, the Contractor shall assume the cost of and responsibility for satisfactorily accomplishing all changes in the work as shown. All directions, specifications and recommendations by manufacturers for the installation, handling, storing, adjustment, and operation of their equipment shall be complied with and responsibility for proper performance shall continue to rest with the Contractor.
- E. Except as otherwise provided for by the provisions of M.G.L. Ch. 30, Sec. 39J, the Contractor shall not have any right of appeal from the decision of the City condemning any materials furnished if the Contractor fails to obtain the approval for substitution in accordance with these provisions. If any substitutuin is more costly, the Contracotr shall pay for such costs

15.0 WARRANTY AND INDEMNIFICATION

- A. In addition to other guarantees or warranties required under law or other sections of the specification, the Contractor warrants all materials furnished and labor performed under this Contract to be free from defects or errors in workmanship or installation for a period of one year from the date of Completion of the work, as certified by the Project Manager. The Contractor shall indemnify the Authority for the full cost of any damage to the property that may result by reason of such defects or errors and shall indemnify the Authority from and against any and all claims, demands, losses, costs, expenses, liabilities and damages, including reasonable attorney's fees and expenses, arising out of or on account of this Contract, including but not limited to claims brought against the Authority for alleged infringement of patents based upon any methods of construction or application of upon materials furnished under the Contract.

END OF SECTION

**CITY OF NEWTON
DEPARTMENT OF PUBLIC WORKS**

SPECIFIC REQUIREMENTS OF THE CONTRACT

QUINOBEQUIN PUMP STATION REPAIRS

SECTION 01270

MEASUREMENT AND PAYMENT

1. GENERAL

- A. The following sections describe the measurement and payment for the work to be done under the respective items listed in the FORM OF GENERAL BID.
- B. The lump sum price stated in the FORM OF GENERAL BID shall constitute full compensation as herein specified, for all of the work completed in accordance with the specifications. All other activities required in connection with performance of the work, including all work required under Division 1, GENERAL REQUIREMENTS, whether described in the contract documents or mandated by applicable codes, permits and laws, will not be separately paid for unless specifically provided for in the form of general bid, but will be considered to be incidental to performance of the overall project.

2. ITEM 1

The lump sum price for Item 1 shall constitute full compensation for furnishing all labor, materials, tools and equipment for constructing the project, complete, as called for in the specifications.

ITEM 2 – ALTERNATE

The lump sum price for Item 2 shall constitute full compensation for furnishing all labor, materials, tools and equipment for constructing this item, complete, as called for in the specifications.

END OF SECTION 01270

SECTION 01014

SCOPE AND SEQUENCE OF WORK

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This Section covers the scope and sequence of work for the pumping station improvements.

1.02 WORK INCLUDED:

A. SCOPE:

The Contractor shall furnish all labor, materials, equipment and incidentals required to complete the work as specified herein. The work includes but is not limited to furnishing and installing the following:

1. Remove and replace pump and motor no. 1.
2. Remove the existing starter for pump no. 1 and install a new 200-horsepower adjustable frequency drive (AFD) above the existing motor control center (MCC).

1.03 PROTECTION OF EXISTING PUMP STATION:

- A. Any work that will interfere with the operation of the existing pumping station must be approved by the Owner. One (1) week written notice shall be given to the Owner before the date approval is required.
- B. If work done by the Contractor interferes with the existing pumping station such that operation of the stations is impaired; the Contractor shall correct the problems to the satisfaction of the Owner, at no additional cost to Owner.

1.04 SEQUENCING:

- A. The following is a suggested order of construction concerning the pumping station construction. It does not purport to cover all work, which may be required to keep the existing station operational during construction.

1. Remove and replace pump and motor No. 1.
2. Remove the existing starter for pump No. 1 and install a new 200-horsepower adjustable frequency drive (AFD) above the existing MCC.
3. Start-up and testing.
4. Removal of salvageable equipment.
5. Clean-up station.

1.05 DEMOLITION:

- A. The demolition work shall include the removal of salvageable equipment as designated by the Owner.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Submit a demolition plan to the Owner for review, describing the proposed sequence, methods, and equipment for the demolition and disposal.
- B. Do not proceed with demolition until the Owner has given written comments on the demolition plan and authorization to proceed.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 DEMOLITION:

- A. Arrange with and perform work required by utility companies and municipal departments for discontinuance or interruptions of utility services due to demolition work.
- B. The Contractor shall take precautions to protect the existing equipment and structures from damage during removal of equipment and materials.

3.02 DISPOSITION OF SALVAGEABLE EQUIPMENT:

- A. The Contractor shall remove and dispose of all salvageable equipment from the existing pumping station, as designated by the Owner.

3.03 DISPOSAL OF DEMOLITION SPOIL:

- A. The Owner has the option of retaining ownership on equipment and materials being removed. All other equipment and materials being removed, not to be retained by the Owner, shall become the property of the Contractor and shall be disposed of by the Contractor in accordance with all applicable regulations, at no additional cost to the Owner.

END OF SECTION 01014

SECTION 11310

WASTEWATER PUMPING EQUIPMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers the furnishing, installation and testing of the wastewater pumps motor, drives and appurtenances for the Quinobequin Pump Station as herein specified.

1.02 RELATED WORK:

- A. Electrical Work is included in Division 16.

1.03 SYSTEM DESCRIPTION:

- A. The wastewater pumping equipment shall consist of a vertically mounted pump and motor to replace the existing pump and motor for the pump station listed above with parameters as specified in the pump and motor schedule (2.02), including frame, seal, close coupled, and electrical system interface, and all associated equipment and accessories required to make a complete system.
- B. This specification directs special attention to certain features, but does not purport to cover all details of the design, manufacture or installation of the pumping unit. Final responsibility for supplying and installing pumping equipment which functions as specified herein rests with the Contractor and his suppliers.
- C. The Contractor shall be required to make the necessary piping modifications on the suction and discharge sides of each pump and on the existing concrete pads to allow proper installation of the new pump.

1.04 QUALITY ASSURANCE:

A. ALL EQUIPMENT SHALL CONFORM TO THE FOLLOWING CRITERIA:

1. Equipment shall be manufacturer's standard products presently in commercial production.
2. Conform to Hydraulic Institute Standards.
3. All equipment specified under this Section shall be furnished by a single supplier and shall be products of manufacturers regularly engaged in the production of said equipment. The supplier shall have the sole responsibility for proper functioning of the complete pumping unit.
4. Any reference to a specific manufacturer or model number is for the purpose of establishing a quality or parameter for specification writing and is not to be considered proprietary. In all cases any source or device that has the quality and operating capabilities specified may be acceptable.
5. Conform to requirements for materials, installation and equipment approvals of state, local, Underwriter's Laboratories, Inc., or other applicable codes, whether or not called for on the drawings or in the specifications.
6. Workmanship shall be first class in all respects.
7. Base the use of unspecified materials on their continuous and successful employment under similar conditions, as called for in this section.
8. The electrical drive equipment specified herein (including drive controller and induction motor) shall be designed and sized by the supplier, who shall assume responsibility for the correct operation of the system. The supplier shall have successfully manufactured, installed and started-up at least 10 systems similar to this installation in the past 5 years.

B. MANUFACTURER'S QUALIFICATIONS:

1. On request from the Owner, the pump manufacturer shall demonstrate proof of financial responsibility with respect to performance and delivery date.
2. On request from the Owner, the pump manufacturer shall provide proof or evidence of facilities, equipment and skills required to produce the equipment specified herein.
3. The manufacturer shall provide the supervisory service of a factory trained Owner, who is specifically trained on the type of equipment supplied, for a period of not less than one 8-hour day to assist in installation of the pumping equipment and related appurtenances, to provide initial startup of each pump and to instruct the Owner's operating personnel in the operation and maintenance of the equipment provided. The specified time period is a minimum time requirement. The actual time required to complete the specified tasks may take longer, but shall be completed at no additional cost to the Owner.
- 4.

C. FACTORY TESTS:

1. General:

Six (6) copies of certified Shop Test results for the pump, stamped and approved by a Registered Professional Owner, in the appropriate field, shall be provided to the Owner.

2. Pump Testing Requirements:

- a. The pump manufacturer shall not ship any pump until after the certified pump performance tests have been submitted to and reviewed by the Owner.
- b. Hydrostatic testing of the pump casing, suction cover and stuffing box cover shall be performed after assembly of the pump. The minimum test pressure shall be the greater of: one point five (1.50) times the shutoff head at maximum speed with full diameter impeller, or one hundred twenty-five (125) psi, whichever is greater. Certified hydrostatic test results shall be submitted to the Owner prior to pump performance testing.
- c. The pump to be furnished under this Section shall be performance tested on water at the pump manufacturer's plant, before shipment. The purpose of performance testing shall be to prove that the pump to be supplied conforms to the Specification requirements, and that the pump can properly operate throughout the entire pump envelope. Tests shall conform to the Standards of the Hydraulic Institute, except as specifically modified herein.
 1. Head
 2. Capacity
 3. Brake horsepower
 4. Efficiency
 5. Vibration
- d. After the completion of the pump performance testing, the pump shall be operated at maximum speed against a closed discharge valve for a minimum of two (2) minutes. After this test is completed, the Owner reserves the right to require that the pump suction cover be removed and an inspection made of the suction cover wear ring and the impeller wear ring. If any contact has occurred between the rings during the shutoff test operation, all pump shall be rejected.
- e. If, in the sole opinion of the Owner, any pump test indicates that the pump performance differs significantly from the Specification requirements and/or the previously submitted pump performance data, the cause of the difference shall be determined and corrected by the manufacturer. The pump shall be retested until it meets the performance requirements specified herein.

3. Motor Testing Requirements

- a. Pump motor shall be designed and manufactured according to the criteria specified in subsection 2.03 of this Section.

- b. Pump motor shall meet or exceed all applicable NEMA standards.
- c. The pump motor to be furnished under this Section shall be tested according to generally recognized "Standard Commercial Tests."
- d. The motor manufacturer shall not ship any motor until after the motor test information has been submitted to and reviewed by the Owner.

D. Field acceptance tests shall be performed as specified in PART 3 EXECUTION.

1.05 REFERENCES:

A. The latest editions of the following standards form a part of this specification:

American National Standard Institute (ANSI)

- ANSI A21.10 Standard for Gray-Iron and Ductile Iron Fittings, 3-in. through 38-in. for Water and Other Liquids.
- ANSI A21.11 Standard for Rubber-Gasket Joints for Ductile Cast-Iron and Gray-Iron Pressure Pipe and Fittings.
- ANSI A21.15 Standard for Flanged Cast-Iron and Ductile-Iron Pipe with Threaded Flanges.
- ANSI A21.51 Ductile-Iron Pipe Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

American Society for Testing and Materials (ASTM)

- ASTM A48 Specifications for Gray-Iron Castings.
- ASTM A53 Specifications for Pipe, Steel, Black and Hot-dipped, Zinc Coated, Welded and Seamless.
- ASTM A108 Steel Bars, Carbon, Cold Finished, Standard Quality
- ASTM D429 Rubber Property - Adhesion to Rigid Substrates
- ASTM D1785 Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.

Massachusetts Electrical Code (MEC)

- 527 CMR 12.00 Massachusetts Electrical Code.

National Electric Manufacturer's Association (NEMA)

- NEMA MG1 Motors and Generators
- NEMA MG1 Motors and Generators

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Prior to shipment, the Contractor shall submit six copies of the following to the Owner:

- 1. Complete shop drawings showing dimensions, materials of construction, and all particulars as herein specified.
- 2. Certified pump curve showing the actual performance of the pump to be supplied under factory testing. The pump shall be tested with actual suction elbow to be furnished for this system as specified.
- 3. Complete Bill of Materials.

4. Proposed pump hydrostatic and performance testing procedures.
 5. Complete test results on each motor from the routine tests as defined in the NEMA standard for a motor of its class and rating to determine that it is free from electrical and mechanical defects and to provide assurance that it meets the design specifications.
 6. Pump Motor performance data for:
 - a. Guaranteed minimum efficiency at 100%, 75%, 50%, and 25% of full load.
 - b. Guaranteed minimum Power Factor at 100%, 75%, 50%, and 25% of full load.
 - c. Locked rotor and full load current.
 - d. Starting, full load, and breakdown torque.
 7. Pump Bulletin
 8. Pump and motor assembly drawings and motor frame size.
 9. Pump and motor storage and installation instructions.
 10. Installation drawings of pump, motor, coupling, base with component weights and dimensions.
 11. Coupling installation instructions.
 12. Coupling Bulleting and Drawings.
 13. Maximum reverse runaway speed calculations.
 14. Complete pump and motor nameplate information.
 15. Certification of factory motor balancing.
 16. Complete functional description of all system components.
 17. Parts lists including the manufacturer's reference and ordering numbers.
 18. Recommended spare parts list with ordering numbers.
- B. Furnish six (6) copies of "Operation and Maintenance" manuals of all equipment supplied and installed. Manuals shall contain, but not be limited to, a complete bill of materials, a preventative maintenance schedule, a list of troubleshooting information, assembly drawings with components clearly identified and numbered, parts lists, wiring diagrams, pertinent technical data and factory service information, warranties and emergency telephone number(s).
- C. Upon completion of installation, six sets of the results of the field and acceptance tests as specified under this section of the specification shall be submitted to the Owner.
- D. Furnish equipment manufacturer's notarized certificates of conformance with the specifications stating that all materials and equipment furnished under this Section conform to all specification requirements.
- E. At the discretion and expense of the Owner, an independent vibration analysis may be conducted on the new wastewater pump. The Contractor and manufacturer will be permitted to witness the test.

1.07 DELIVERY, STORAGE, AND HANDLINGS:

A. SHIPPING:

1. The wastewater pump, materials and spare parts shall be shipped complete and ready for installation except where partial disassembly is required by transportation regulations, is recommended by the manufacturer or for protection of components.
2. All anchor bolts and embedded items required for complete installation or mounting, holding down or supporting of equipment to be furnished under this section, including necessary location drawings and templates required to install the items in concrete, masonry, etc., shall be furnished and delivered to the site by the manufacturer of the equipment furnished under this section, for installation under other sections of the specifications. Delivery of these items shall be as required by the overall construction schedule.
3. Spare parts shall be packed in containers bearing labels clearly designating contents and pieces of equipment for which intended.
4. Spare parts shall be delivered to the site at the same time as the basic equipment and turned over to the Owner after completion of work.

B. STORAGE:

1. The Contractor shall receive, store, and safeguard all equipment, materials, and spare parts at the job site.
2. The pump motor shall be stored on-site and protected according to motor manufacturer's recommendations until the pump is operational and accepted by the Owner.

1.08 WARRANTY:

- A. The pump and motor manufacturer shall each individually and separately warranty that the equipment they supplied under this Section fully meets the criteria specified herein, and shall further warranty that the equipment is free from all defects in materials and workmanship.
- B. The manufacturer's warranties from defects shall contain a provision that the manufacturer shall repair or replace any defects, to the satisfaction of and at no additional cost to the Owner, for a period of twenty-four (24) months for the pump and motor, from the date of Substantial Completion of the project.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Fairbanks Morse
- B. Cornell Pump Company
- C. An acceptable equivalent manufacturer.

2.02 PUMPING EQUIPMENT SCHEDULE

- A. The contractor shall furnish and install vertically mounted, closed coupled, end suction, solids handling, centrifugal pumping unit as specified herein at the locations listed below:

Description

Quantity

Quinobequin Pump Station

1

- B. The Pump Station pump shall have the necessary characteristics and be properly selected to perform under the following operating conditions:

Design Point

5,000gpm @ 91' TDH

Minimum Efficiency over Pumping Range	75%
Minimum Horsepower	75
Maximum Allowable Operating Speed, RPM	1,200
Minimum Spherical Solid Diameter to be Passed	3 inches

The existing pump and motor has the following model and serial numbers, and characteristics:

Pump

Manufacturer: ***Fairbanks Morse***
Serial No.: K3W1-070295-3
Diameter: 10" Suction
10" Discharge

Motor

Manufacturer: ***Marathon Electric***
Size: 200 horsepower, 460-volt, 3 phase, 60 hertz, 1185 rpm
Frame: ***445TSC***
Type: TDS
Code: G

2.03 PUMP:

A. The centrifugal pump shall be a vertical close-coupled type unit. The unit shall include pump, high ring base, coupling, coupling guard and vertical solid shaft motor.

B. PUMP BASE:

1. The pump shall be supported by a cast-iron or fabricated steel pedestal base with openings large enough to permit access to the suction line to the inspection opening in the suction elbow. The base shall be rugged enough to support the full weight of the pump. The legs of the pedestal base shall be of such length that the suction elbow of the pump will not touch the floor or the level foundation upon which it is anchored.
2. The base shall be suitable for attachment to existing foundation materials. The pump manufacturer shall investigate the existing composite pump base support foundation pads, and provide such adapter plates and/or fabricated components as necessary to result in correct alignment of pump suction and discharge nozzles to existing piping connection points. The pump manufacturer shall provide all anchorage and attachment hardware for installation, leveling and securing base to the existing composite foundation. All leveling shims, anchor bolts, and associated hardware shall be 316 stainless steel.

C. CASINGS:

1. The pump casing shall be made of hard, close-grained cast iron conforming to ASTM A48, Class 30, of ample thickness, capable of prolonged resistance to the abrasive action of solids or foreign matter contained in the liquid passing through the pump. Ample and convenient access to the impeller and interior parts shall be provided by means of handholes, removable plates, or otherwise as approved.
2. Handholes shall be equipped with covers designed for easy removal. The interior surface of the covers shall be shaped to continue the contour of the interior of the casing to which it is attached so as to maintain efficiency and to prevent lodging of solids.
3. The high point of the casing shall be fitted with an air vent and the low point fitted with a drain.

4. The pump suction and discharge nozzles shall be drilled and tapped for installation of pressure gauges and the suction and discharge connections shall have flanges faced and drilled in accordance with the 125-pound American Standard.
5. The pump casing shall be tested under a hydrostatic head of at least 75 psi or 150 percent of the rated shut-off head, whichever is greater.
6. Pump design shall incorporate double suction wear rings, of the peripheral design, requiring no axial adjustment. One wear ring shall press-fit into the case, with the corresponding mating ring press fit onto the impeller. Wear rings shall be replaceable AISI 420 stainless steel.

D. SUCTION COVER / ELBOW

1. The suction cover/elbow shall be a separate cast piece, made of ASTM A48 Class 30 Cast Iron. The cover shall bolt in a register fit to the pump volute. The elbow shall incorporate a bolt-on contoured cleanout cover.
2. The suction flange shall be designed to accept an ANSI Class 125 lbs. flange of the size specified herein.

E. FRAMES:

1. The fronthead shall be made of close-grained cast iron conforming to ASTM A48 Class 30. The fronthead shall be cast separately and connected to the (suction elbow) combination base elbow).
2. The back head adapter shall be cast iron construction, flanged and machined on both ends to maintain alignment between the pump and driver and to eliminate vibration. The back head frame shall be built to allow for complete removal of bearings, shaft and impeller by unbolting it from the volute casing.
3. The main frame shall be made of hard, close-grained cast iron and shall be fitted to the casing with machine-faced joints. The design shall be heavy and rigid, so as to resist safely and without distortion the stresses due to impeller thrust and the bearing loads. The frame shall have housings for two sets of grease-lubricated ball or roller bearings. If ball bearings are used, at least one set shall be a combination radial and thrust bearing. Bearings shall be mounted in dust and moistureproof enclosures incorporating lip-type grease seal in contact with the shaft to prevent the entrance of contaminants. Jacking bolts for external impeller adjustments are required. Zerk-type grease fittings for bearing lubrication shall be supplied at the bearing housings.
4. A suitable drain shall be provided at the low point of the main frame.

F. SHAFTS:

1. The pump shafts shall be high strength, AISI 1144 steel or better, "Stressproof" treated for hardness and strength. It shall be Owned to transmit full driver horsepower with a liberal safety factor and minimum deflection. The shaft shall be accurately machined and polished, and statically and dynamically balanced. Minimum shaft diameter shall be not less than 2.125 inches. All steps in shaft diameter shall be radiused.
2. Shaft deflection shall not exceed 0.002 inches, as measured at end of suction wear ring, when operating at design conditions. Pump manufacturer shall submit a shafting stress analysis in support of same.
3. A replaceable shaft sleeve shall be provided, extending through the stuffing box, positively locked to prevent rotation, and sealed to the shaft utilizing an O-ring fit into an internal groove on the sleeve. The sleeve shall be a minimum of 0.375" larger in O.D. than the shaft, and be constructed of stainless steel, heat-treated to a minimum Brinell hardness of 350.

G. IMPELLER:

1. The impeller shall satisfy the physical and tensile strength requirements of ASTM A48, Class 30.
2. The impeller shall be single-suction, symmetrical and statically and dynamically balanced, and of non-clog design. Non-clog impellers shall be built with a minimum number of vanes or blades and shall allow impeller waterways and

clearance between the maximum size impeller periphery and volute cutwater to pass spherical solids as indicated in Section 2.02. Provision shall be made for external impeller adjustment without the use of shims.

3. Impeller vanes shall be free of sharp edges and waterways shall have smooth contours and well-rounded entrances. The impeller hub shall not have ports for reduction of thrust on the impeller. The impeller shall be key-seated and held securely to the shaft using a stainless steel washer and stainless steel lockscrew, or by an equally efficient method which shall permit easy removal of the impeller and shall also be capable of holding securely in the event of pump reversal to full runaway speed. No positioning adjustment shall be required.
4. The impeller shall accept a radial press-fit wear ring which requires no "on site" external adjustments. External adjustments for the wearing surfaces shall not be accepted. Removable wearing rings made of stainless steel of different degrees of hardness shall be installed on the impeller and in the pump casing at the suction side. They shall be securely fastened to prevent any relative rotation, and shall be designed to compensate for a minimum of one-eighth inch wear. The casing wearing ring shall not contain less than 7 percent chromium.

H. BEARINGS:

1. Pump bearings shall be of the ball or roller type. Each pump shaft shall be supported by two sets of bearings suitable for the entire loads and arranged for grease lubrication. The outboard bearing shall be of the angular contact, duplex mounted type ball bearing for thrust and radial loads. The inboard bearing shall be of the spherical roller type, being self aligning.
2. The bearings shall be properly protected from corrosion during shipment and installation. Bearings shall be designed in accordance with the Anti-Friction Bearing Manufacturers Association, Inc. Standards for 40,000 hours minimum life at conditions of operation. All bearings shall have a minimum L-10 life of 100,000 hours.

I. MECHANICAL SEALS:

1. A backplate with deflector vanes constructed of ASTM A48 Class 30 Grey Iron shall be provided, including a single mechanical seal, John Crane Type 1 of material code BD80581 (Tungsten Carbide versus Silicon Carbide). The design shall allow for continuous operation without the need for external flush water or venting.
2. The seals shall be equipped with flushing assemblies. The volutes shall be tapped and ¾-inch brass piping shall be installed to convey water from the volute to the filter housings. Each filter housing shall contain a 10-micron filter. Water shall be conveyed from the filters to the seals through ¼-inch tygon tubing. A ball valve shall be installed on either side of the filters to allow the replacement as required.

J. FLEXIBLE COUPLING:

The coupling between the pump and motor shall be an all-steel grid type, flexible coupling, designed for both angular and parallel misalignment and free-end float, and shall be provided with means of lubrication.

K. MOTOR:

1. The motor shall be vertical, totally enclosed, fan cooled, premium efficiency, squirrel cage, induction type, rated for continuous duty operation. NEMA Class F insulation with NEMA Class B temperature rise based on a 40 degree C ambient temperature, 1.0 service factor for operation on variable frequency and capable of operating on 3 phase, 60 Hertz, 460 volt current. The motor shall be designed, manufactured and tested in accordance with NEMA standard MG1.
2. The speed and horsepower rating of the motor shall be as indicated in 2.02 PUMPING EQUIPMENT SCHEDULE. The motor shall have a KVA per horsepower rating of NEMA code letter G or lower.
3. The motor manufacturer shall certify in writing that the motors meet the limits for amplitude and velocity of vibrations as outlined by the manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Installation of the pump and related appurtenances shall be performed in accordance with all written instructions furnished by the manufacturer.
- B. After installation, the Contractor shall clean all surfaces damaged in shipment or installation and shall touch up in the field with the same materials as the original coatings.

3.02 FIELD ACCEPTANCE TESTS:

- A. After installation of the equipment and after completion of the services of the manufacturer's representative, the Contractor shall operate the unit to demonstrate its ability to pump without excessive vibration, overloading of the motor, or overheating. The pump shall be operated for a sufficient period of time to permit thorough observation of all pump components.
- B. Start-up and testing shall be conducted in accordance with Section 1752, STARTUP AND TESTING.
- C. Performance tests shall be conducted on the pumping unit installed. The tests shall be conducted for the parameter of head capacity, overall system efficiency, and overall system power requirements. These parameters shall be measured and documented in writing.
- D. All pumping equipment shall be tested to check for proper operation, proper alignment, faulty equipment, and for excessive vibration. The Contractor shall provide vibration testing by a qualified and independent testing company. This testing of the complete system shall cover all duty conditions outlined in this Section of the Specifications. The vibration testing shall be conducted in the presence of the pump and pump motor field service representatives in accordance with procedures outlined in the applicable sections of the Hydraulic Institute Standards.
- E. In the event vibration exceeds the specified limits and the cause of the vibration is attributable to the pumping equipment, the equipment manufacturers shall make the necessary balancing or alignment adjustments to bring the equipment to within the specified limits.
- F. The completed pump and motor installation shall be tested for sound generation in accordance with the Hydraulic Institute Standards for sound measurement from pumping equipment.
- G. Any and all alterations, modifications, additions and/or work necessary to rectify defects or non-conformance with this Section of the Specification shall be in such a manner as to provide for the satisfactory operation of the pump and pump motor, all at no additional cost to the Owner.
- H. All defects and defective equipment shall be corrected or replaced or corrected by methods approved by the Owner, promptly at the Contractor's expense.
- I. All final adjustments necessary to place the equipment in satisfactory working order shall be made prior to the tests.
- J. If sufficient sewage is not available for the test, the Contractor shall provide water for testing. The Contractor shall furnish all labor and materials necessary for the test.
- K. After installation, all piping connections shall be tested for tightness in an approved manner. Should leaks be found, faulty joints shall be repaired, even to the extent of disassembling and remaking the joint, and all defective pipe and fittings shall be removed and replaced in a manner satisfactory to the Owner.

3.03 SPARE PARTS:

- A. The Contractor shall furnish and deliver to the Owner at the site of the work the following spare parts, all of which shall be identical and interchangeable with similar parts installed in the work.
 - 1. One set of gaskets required for each pump.
 - 2. One complete set of wearing rings for each impeller and bearing.

END OF SECTION 11310

SECTION 01752

STARTUP AND TESTING

PART 1 – GENERAL

A. WORK INCLUDED:

This Section includes the startup and testing services required for the pump station during system startup.

B. SYSTEM DESCRIPTION:

C. The Contractor shall perform pump station startup to the satisfaction of the Owner. Startup and testing shall not be initiated until all required certifications and other required documentation has been submitted, as described herein.

D. The purpose of the startup test is to provide a final operational checkout of all equipment prior to beneficial use by the Owner.

E. As most components of each pump station are interrelated, substantial completion of the project shall not be certified until successful completion of startup.

F. SEQUENCING:

Testing, operator training and other like services to be provided under the technical sections of the specifications are not to be performed during startup without written authorization from the Owner.

G. SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

H. Three copies of the following shall be forwarded to the Owner for review two (2) weeks prior to commencement of startup:

I. Certification by a representative of the manufacturer that each piece of equipment has been installed properly and is ready for operation.

J. Certification by a representative of the equipment manufacturer that all equipment requiring calibration has been properly calibrated.

K. A schedule of the testing, including staffing, and specific testing and operation of individual equipment items.

L. At the conclusion of the test, all information recorded during the test shall be forwarded to the Owner.

C. This test is not to be utilized as a general debugging of the system. All equipment shall be started, tested and calibrated prior to this test. This includes automatic and manual operation as well as instrumentation interfacing.

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

M. PREPARATION:

N. Prior to commencement of testing, the Owner shall be given three (3) days' written notice.

O. The Contractor shall complete final debugging prior to startup.

P. All telemetry equipment shall be operational prior to testing.

Q. The test shall be performed.

3.02 TEST PROCEDURES:

- R. It is the general responsibility of the Contractor to insure that all equipment is completely operational throughout the test; provide the Owner with proper technical assistance as required to completely test all equipment and alarms; provide adequately trained personnel who can operate the pump station on an on/off basis so that the equipment is not damaged, whether the Owner or Owner is present or not during that portion of the test.
- S. It is the general responsibility of the Owner during the test period to supervise the testing of all equipment, associated alarms and devices; to vary the operation of the equipment as necessary, and to pump as required.
- T. STOPPING OF TEST:
- U. The Owner shall stop the testing for any of the following reasons:
- V. Failure of critical system, including:
- W. Pump
- X. Failure of any of the above systems to operate on standby power.
- Y. If the test is stopped for any reason, the test shall be restarted from the beginning. The Contractor shall pay all costs associated with the Owner supervising additional testing as required.

END OF SECTION 01752

SECTION 16050

ELECTRICAL WORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required to make ready for use the complete electrical systems as shown on the Drawings and as specified hereinafter.
- B. In conjunction with other sections of Division 16, the work shall include furnishing and installing the following:
 - 1. Electrical raceway systems
 - 2. Wires and cables
 - 3. Miscellaneous equipment
- C. Make all necessary connections at "packaged" equipment furnished under other sections and Divisions of these specifications.
- D. Make all connections to equipment and devices furnished under Division 16 and other sections of these specifications except as otherwise specified.
- E. Connect process and instrumentation cables furnished with field-mounted equipment under other sections and Divisions of these specifications.
- F. Mount all motor control equipment enclosures not factory mounted, unless otherwise indicated.
- G. It is the intent of these specifications that the electrical system shall be suitable in every way for the service required. All material and all work which may be reasonably implied as being incidental to the work of this section shall be furnished at no extra cost to the Owner.

1.02 RELATED WORK:

- A. The Contractor's attention is directed to the General Conditions, Supplementary Conditions.
- B. Excavation and backfilling required for underground electrical work is included under Division 2.
- Z. Concrete work and reinforcing for electrical equipment pads is included under Division 3.

1.03 CODES, INSPECTIONS AND FEES:

- A. All material and installations shall be in accordance with the latest edition of the Massachusetts Electrical Code and all applicable local codes and ordinances.
- B. Obtain all necessary permits and pay all fees for permits and inspections.

1.04 PERFORMANCE OF WORK:

- A. Each three-phase circuit shall be run in a separate conduit unless otherwise shown on the Drawings.
- B. Where circuits are shown as "home-runs" all necessary fittings and boxes shall be provided for a complete raceway installation.
- C. Any work installed contrary to or without review by the Owner shall be subject to change as directed by the Owner, and no extra compensation will be allowed for making these changes.

- D. Exact locations shall be as determined by the Owner during construction. Obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Owner and furnish all labor and materials necessary to complete the work in an acceptable manner.
 - E. Furnish all labor and materials necessary to install and place in satisfactory operation all power, and other electrical systems. Additional circuits shall be installed wherever needed to conform to the specific requirements of the equipment.
 - F. All connections to equipment shall be made as required and in accordance with the approved shop and setting drawings.
- 1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:
- A. Complete shop drawings shall be submitted.
 - B. The manufacturer's name, product designation or catalog number, descriptive literature and data shall be submitted for the following material and equipment:
 - 1. Conduit
 - 2. Wires, cables and appurtenances
 - C. Prior to submittal, all shop drawings shall be checked for accuracy and conformance to contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to the specifications and drawings. This statement shall also list all discrepancies with the specifications and drawings. Shop drawings not so checked and noted shall be returned.
 - D. The Owner's review shall be only for conformance with the design concept of the project and compliance with the specifications and drawings. The responsibility of, and the necessity of, furnishing materials and workmanship required by the specifications and drawings which may not be indicated on the shop drawings is included under the work of this section.
 - E. The responsibility for all dimensions to be confirmed and correlated at the job site and for coordination of this work with the work of all other trades is also included under the work of this section.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. The materials used in all systems shall be new, unused and as hereinafter specified. All materials, where not specified, shall be of the very best of their respective kinds. Samples of materials or manufacturer's specifications shall be submitted for review as required by the Owner.
- B. Materials and equipment used shall be Underwriters' Laboratories, Inc. listed.
- C. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored out-of- doors. Electrical equipment shall be stored in dry permanent shelters. If any apparatus has been damaged, such damage shall be repaired at no additional cost. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Owner, or shall be replaced at no additional cost to the Owner.
- D. The Contractor's attention is directed to the requirements of the various sections of Division 16 for additional product specifications.

2.02 MANUFACTURER'S NAMEPLATES:

- A. All equipment shall have the manufacturer's name, address, model or type designation, serial number and all applicable ratings clearly marked thereon in a location which can be readily observed after installation. The required information may be die-stamped into the surface of the equipment or may be marked on durable nameplates permanently fastened to the equipment.

PART 3 - EXECUTION

3.01 TESTS AND ADJUSTMENTS:

- A. Test all systems furnished under Division 16 and repair or replace all defective work. Make all necessary adjustments to the systems and equipment and instruct the Owner's personnel in the proper operation of the systems and equipment. The Owner reserves the right to videotape the instruction sessions for future use in training.
- B. The Contractor's attention is directed to requirements of the various sections of Division 16 for additional test specifications.

END OF SECTION 16050

SECTION 16120
WIRES AND CABLES

PART 1 - GENERAL

- 1.01 **WORK INCLUDED:**
- A. Furnish, install and test all wires, cable and appurtenances as shown on the drawings and as specified hereinafter.
 - B. The Contractor's attention is directed to the requirements of Section 16050, ELECTRICAL WORK - GENERAL PROVISIONS.
- 1.02 **SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:**
- A. Samples of proposed wire shall be submitted for review. Each sample shall have the size, type of insulation and voltage stencilled on the jacket.
 - B. Acceptable samples will be sent to the project locations for comparison by the Owner with the wire actually installed.
 - C. Installed, unacceptable wire shall be removed and replaced at no additional cost to the Owner.
 - D. Manufacturer's data and descriptive literature shall be submitted for all wire and cable.
- 1.03 **APPLICATIONS:**
- A. Wire for power and lighting circuits shall be Type XHHW.
 - B. Wire for control, indicating and metering circuits shall be Type THWN, No. 14 AWG, 19-strand.
 - C. Ground wires shall be Type XHHW or THWN, green.
 - D. Except for control, indication, metering and signal wiring, no conductor smaller than No. 12 AWG shall be used. Wire sizes shall be not less than required by the Massachusetts Electrical Code.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Conductors shall be annealed, 98 percent conductivity, soft-drawn copper.
- B. All conductors No. 10 AWG and larger shall be stranded.

2.02 BUILDING WIRE:

- A. Type XHHW wire shall be 600 volt, cross-linked polyethylene insulated, as manufactured by Pirelli Cable Corp., Collyer Insulated Wire Co.; the Okonite Co., or equal.
- B. Type THWN wire shall be 600 volt, cross-linked polyethylene insulated with nylon jacket, as manufactured by Pirelli Cable Corp., Collyer Insulated Wire Co.; the Okonite Co., or equal.

2.03 WIRE MARKERS:

- A. Wire markers shall be self-adhesive, vinyl coated, polyester film.

2.04 TERMINALS:

- A. Wire terminals shall be insulated, crimp type with tin plated, copper flanged fork and serrated barrel.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. All conductors shall be carefully handled to avoid kinks or damage to insulation.
- B. Lubrication shall be used to facilitate wire pulling. Lubricants shall be U.L. listed for use with the insulation specified.
- C. Crimp type terminals shall be used at all screw type control wire terminals.
- D. All wires and cables shall be uniquely identified with wire markers at each termination and splice.

END OF SECTION 16120

SECTION 16130

RACEWAYS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall furnish and install the complete raceway systems, with all accessories, fittings, boxes, etc., as shown on the drawings and as specified hereinafter.
- B. The Contractor's attention is directed to the requirements of Section 16050, ELECTRICAL WORK - GENERAL PROVISIONS.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Manufacturer's data and descriptive literature shall be submitted for all materials specified hereinafter.

1.03 APPLICATIONS:

- A. All wiring shall be installed in rigid steel conduit, except as otherwise shown on the drawings or specified hereinafter.
- B. Fittings, exposed switch, outlet and control station boxes and other exposed boxes 4" square and smaller shall be cast or malleable iron.
- C. Liquidtight, flexible metal conduit shall be used for all connections to equipment subject to vibration.
- D. No conduit smaller than 3/4" electrical trade size shall be used, except as otherwise shown on the drawings. Box sizes shall not be less than that required by the Massachusetts Electrical Code.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Rigid steel conduit shall be heavy-gauge steel, hot-dipped galvanized per ASTM A123 inside and outside over the entire length including threads and shall have an additional factory-applied sealing finish inside and outside. Conduit shall be as manufactured by Youngstown Sheet and Tube Co.; Allied Tube and Conduit Corp.; Wheeling-Pittsburg Steel Corp., or equal. Rigid steel conduit shall be furnished with a coupling on one end and thread protector on the other.
- B. Liquidtight, flexible metal conduit shall consist of a flexible, corrosion resistant metal core with an extruded, watertight, synthetic jacket. Conduits smaller than 1-1/2" shall have a continuous ground conductor under the jacket. Conduit shall be sealtite Type UA manufactured by Anaconda Metal Hose Div., or as manufactured by American Flexible Conduit Co., Inc.; Universal Metal Hose Co.; or equal.
- C. BOXES AND FITTINGS:
 - 1. Sheet metal boxes shall have continuously welded seams, ground smooth. Steel boxes shall be hot-dipped galvanized after welding. Box bodies shall be flanged and shall be without holes or knockouts. Bodies shall be not less than 14 gauge metal and covers shall be not less than 12 gauge metal. Covers shall be gasketed and fastened with stainless steel hardware. Boxes shall be as manufactured by Hoffman Engineering Co.; Superior Switchboard & Devices; Sun Metal Products Div; or equal.
 - 2. Cast or malleable iron boxes and fittings shall have cadmium-zinc finish with cast covers and stainless steel screws as manufactured by the Crouse-Hinds Co.; Appleton Electric Co.; L.E. Mason Co.; or equal.

3. Conduit elbows shall be of the same material and construction as the conduits to which they are connected.
 4. Conduit hubs shall be as manufactured by Myers Electric Products, Inc.; Raco, Inc.; Appleton Electric Co.; or equal.
 5. Fittings used with liquidtight, flexible conduit shall be of the screw-in, compression type with sealing ring. Fittings larger than 1-1/4" shall be furnished with integral ground lugs. Fittings shall be as manufactured by Thomas and Betts Co.; Crouse-Hinds Co.; Appleton Electric Co.; or equal.
- D. Hangers, rods, backplates, beam clamps, etc. shall be hot-dipped galvanized iron or steel. They shall be as manufactured by the Appleton Electric Co.; Thomas and Betts Co.; Unistrut Corp.; or equal. Items used in the chlorine room shall have a factory-applied PVC coating.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Exposed conduits shall be run parallel to or at right angles to walls. Conduit runs shall be straight and true. Conduit shall be supported by means of one-hole pipe clamps. One-screw backplates shall be installed where required to raise conduits from the surface. Multiple, horizontal runs shall be supported on trapeze hangers with steel horizontal members and threaded rods not less than 3/8 inches diameter. Hangers shall be attached to structural steel by means of beam clamps. Spot type inserts shall be used in concrete.
- B. Conduit bends shall be carefully made to prevent distortion of the circular cross-section. No conduit run shall have more than the equivalent of three 90 degree bends between pulling points. Changes in direction shall be made with bends, standard elbows and pull boxes. Bends in parallel runs shall be concentric.
- C. Conduit shall not be supported from piping, piping supports, or mechanical equipment subject to vibration or removal.
- D. The ends of all conduits shall be tightly plugged during construction until wires are to be pulled. Spare conduits shall be furnished with threaded caps.
- E. Conduits shall be terminated at pressed steel boxes and ungasketed sheet metal enclosures with double locknuts and suitable bushings. Bushings installed on conduits containing ground wires shall be grounding type. Conduits shall be terminated at gasketed sheet metal enclosures with conduit hubs.
- F. Steel conduit connections shall be made with threaded fittings.
- G. Wire shall not be pulled until the conduit system is complete in all details.

END OF SECTION 16130

SECTION 16483

VARIABLE FREQUENCY DRIVE SYSTEM

PART 1 – GENERAL

1. WORK INCLUDED:

- A. The Section covers furnishing, installation and testing of variable frequency drive (VFD) and appurtenances, complete as herein specified.

2. SYSTEM DESCRIPTION

- A. The variable frequency drive system specified herein is intended to replace the existing motor starter for the 200-horsepower motor for pump no. 4 at the Quinobequin Wastewater Pump Station.
- B. The existing reduced voltage transformer starter and associated component shall be removed from the motor control center (MCC). The main breaker and run indicators shall remain.
- C. A new 200-horsepower VFD shall be mounted above the MCC in place of the reduced voltage starter. The new VFD shall have the display and programmer remotely mounted on the MCC enclosure door.

3. QUALITY ASSURANCE:

4. ALL EQUIPMENT SHALL CONFORM TO THE FOLLOWING CRITERIA:

1. Equipment shall be a manufacturer's standard product presently in commercial production.
2. This specification directs special attention to certain features, but does not purport to cover all the details of the design, manufacture or installation of the VFD. Final responsibility for supplying and installing the VFD which functions as specified herein rests with the Contractor and his suppliers.
3. Conform to Hydraulic Institute Standards.
4. All equipment specified under this Section shall be furnished by a single supplier and shall be products of manufacturers regularly engaged in the production of said equipment. The supplier shall have the sole responsibility for proper functioning of the complete VFD.
5. Any reference to a specific manufacturer or model number is for the purpose of establishing a quality or parameter for specification writing and is not to be considered proprietary. In all cases any source or device that has the quality and operating capabilities specified may be acceptable.
6. Conform to requirements for materials, installation and equipment approvals of state, local, Underwriter's Laboratories, Inc., or other applicable codes, whether or not called for on the drawings or in the specifications.
7. Workmanship and the method and materials of construction shall conform to the best practice and highest standards applicable for the design use as specified.
8. The VFD equipment specified herein shall be designed and sized by the supplier, who shall assume responsibility for the correct operation of the system. The supplier shall have successfully manufactured, installed and started-up at least 10 systems similar to this installation in the past 5 years.

5. MANUFACTURER'S QUALIFICATIONS:
6. On request from the Owner, the variable frequency drive (VFD) manufacturer shall demonstrate proof of financial responsibility with respect to performance and delivery date.
7. On request from the Owner, the VFD manufacturer shall provide proof or evidence of facilities, equipment and skills required to produce the equipment specified herein.
3. The manufacturer shall provide the supervisory service of a factory trained Owner, who is specifically trained on the type of equipment supplied, for a period of not less than 4-hours to assist in installation of the VFD and related appurtenances, to provide initial startup and to instruct the Owner's operating personnel in the operation and maintenance of the equipment provided. The specified time period is a minimum time requirement. The actual time required to complete the specified tasks may take longer, but shall be completed at no additional cost to the Owner.
4. The manufacturer of the VFD specified herein shall have a factory trained service Owner in residence for at least 50 major cities within the United States.
8. REFERENCES:
- A. The VFD and all components shall be designed, manufactured, and tested in accordance with the latest applicable standards of ETL, UL, ANSI, and NEMA.
9. SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:
- A. Prior to shipment, the Contractor shall submit to the Owner for review, six copies of each of the following: complete shop drawings, complete wiring diagrams, complete operating and maintenance instructions, parts lists, and complete Bill of Materials. The certified pump curves shall show the actual performance of the pumps under factory testing.
- B. A complete, easily readable functional description of the proposed equipment.
- C. Upon completion of installation, the results of the field and acceptance tests as specified under this section of the specification shall be submitted to the Owner.
- D. Furnish written certification from the manufacturer's representative of the proper installation of each component.
- E. OPERATIONS AND MAINTENANCE MANUALS (six sets):
1. Complete operations and maintenance information for this specific equipment.
2. Furnish "Operation and Maintenance" manuals of all equipment supplied and installed. Manuals shall contain, but not be limited to, a complete bill of materials, a preventative maintenance schedule, a list of troubleshooting information, assembly drawings with components clearly identified and numbered, parts lists, wiring diagrams, pertinent technical data and factory service information, warranties and emergency telephone number(s).
3. These manuals shall be reviewed by the Owner for completeness; those that are deemed inadequate shall be returned for correction.
4. Complete parts list including the manufacturer's reference and ordering numbers.

5. A complete list of the manufacturer's name, address and phone number, the local representative's name, address and phone number, the model number and serial number of all equipment supplied
6. Recommended Spare Parts List.

F. INSTALLATION SUBMITTALS (SIX SETS):

10. Upon completion of installation, the results of the field and acceptance tests as specified under this section of the specification shall be submitted to the Owner.
11. Furnish written certification from the manufacturer's representative of the proper installation of each component.

12. STORAGE:

- A. The contractor shall receive, store, and safeguard all equipment, materials, and spare parts at the job site.

13. WARRANTY:

14. The VFD manufacturer shall warranty that the equipment they supplied under this Section fully meets the criteria specified herein, and shall further warranty that the equipment is free from all defects in materials and workmanship.
15. The manufacturer's warranties from defects shall contain a provision that the manufacturer shall repair or replace any defects, to the satisfaction of and at no additional cost to the Owner, for a period of sixty (60) months for the VFD, from the date of Substantial Completion of the project.

PART 2 – PRODUCTS

2.01 VARIABLE FREQUENCY DRIVE SYSTEM

A. VARIABLE SPEED A/C CONTROLLER

1. The alternating current (a/c) drive system outlined below shall provide variable speed to the existing electric motor at the pump station. The motor specifics are as follows:
 - Voltage, V – 460
 - Phase – 3
 - Amps – 177
 - Horsepower, hp – 200
 - Hertz, Hz – 60
16. The VFD equipment specified herein shall be designed and sized by the supplier, who shall assume responsibility for the correct operation of the system. The supplier shall have successfully manufactured, installed and started-up at least 10 systems similar to this installation in the past 5 years.
17. The manufacturer of the VFD equipment specified herein shall have a factory trained service Owner in residence for at least 50 major cities within the United States.
18. The VFD's shall be as manufactured by Cutler Hammer, Cleveland, OH, and shall be model SV9200AS-5M0A00 with remote keypad mounting kit.
19. 3% line reactors shall be furnished for installation between the power supply and each drive cabinet.
20. The VFD shall consist of a 200 hp, 480-volt, three, phase rated unit including but not limited to main circuit breaker, operator keypad, fault diagnostics, NEMA 1 enclosure, complete micro processor based circuitry, electrical system interface and all associated equipment and accessories required to make a complete and operable system.

21. The VFD's shall be of the Pulse Width Modulated (PWM) design converting the utility input voltage and frequency to a variable voltage and frequency output via a two-step operation. Variable Current Source VFD's are not acceptable. Insulated Gate Bipolar Transistors (IGBT's) shall be used in the inverter section. Bipolar Junction Transistors, GTO's or SCR's are not acceptable.
- a. The VFD shall be microprocessor based and utilize digital input for parameter adjustments. Use of potentiometers for parameter adjustment is not acceptable.
 - b. The VFD shall automatically attempt to restart after a malfunction or an interruption of power. The number of attempted restarts shall be customer selectable (0 to 5). If the drive reaches the limit of restarts without successfully restarting and running for a customer selectable length of time (60 to 600 seconds), the restart circuit shall lockout and shall provide contact annunciation.
 - c. A current limit circuit shall be provided to limit motor current to a preset variable maximum level by reducing the drive operating speed or acceleration rate when the limit is reached. Range of adjustment shall be from 50 to 110%.
 - d. The VFD shall include a digital display and digital input programming capability on the main logic board. The display shall; be programmable for indication of output speed in rpm, frequency or percent of base speed: motor amps, output motor volts, kilowatts and output load. The display shall also function as a first fault indicator. The VFD shall be programmable to display a maintenance schedule. Displays shall be labeled for the item and units.
 - e. The VFD shall provide a minimum of four selectable frequency jump points, in 1.5 Hz increments, to be used to avoid critical resonance frequencies of the mechanical system.
 - f. The input signal follower circuit shall have selectable differential inputs and accept an electrical speed command from an external source rated at 4-20 ma or voltage signals of 0-5 or 0-10 Vdc. The input follower circuitry shall be capable of operating directly or inversely proportional to the above listed speed commands.
 - g. Continuous electronic motor overload protection shall be provided which is capable of predicting motor winding temperature based on inputting specific parameters including motor design type – TEFC, ODP and speed range. The protection shall provide an orderly shutdown should the motors thermal capabilities be exceeded.
 - h. The VFD shall include three configurable output relays rated at 7 amps minimum and 4 digital outputs.
 - i. The VFD shall include analog output signals for output load and motor voltage.
 - j. Up to five preset speeds shall be selectable through a communications port, or contact closures. Up to eight (8) preset speeds shall be selectable through terminal inputs. The individual speeds shall be customer variable and selectable.
 - k. The VFD shall include proportional and integral gain constant inputs for process control requirements.

- l. The VFD stopping mode functions shall be selectable for coast to rest or stopping at programmed decelerate.
 - m. The VFD shall provide up to eight selectable V/Hz profiles.
 - n. Full wave rectification shall be achieved with input diode in a conventional bridge configuration and shall be used to supply voltage to the DC bus.
 - o. The DC shall be filtered by a series choke between the input section and one or more capacitors short circuit and ground fault protection. The use of DC bus chokes shall be required to reduce input transformer sizing requirements (by 25 to 50%) of the main power distribution transformer vs VFDs that use only dc bus capacitors. VFDs which use only bus capacitors require that input isolation transformers or input line filters be supplied. Use of isolation transformers reduces systems efficiency (4 to 5%) and will be weighted against designs where not required.
 - p. The inverter shall use semi conductor output devices to provide three-phase output power to the motor. The VFDs system efficiency data shall be provided at operating points (speed and load) typical for variable torque loads.
9. The VFD shall operate within the following output ratings.
 - a. Frequency range, 1-66 Hz
 - b. Frequency resolution, .1% of base speed with analog input .025% with digital input.
 - c. Frequency accuracy within .05% of setpoint.
 - d. Overload rating, 150% for one minute.
 22. The VFD shall provide 3% speed regulation.
 23. The VFD shall operate within 380 to 480 V +5%/- 10%.
 24. Standard setup adjustments shall include; Minimum speed, 0 to 60%; Maximum speed 45 to 100%; Linear accel, .5 to 600 seconds; Linear decel, .5 to 600 seconds; Maximum output voltage, variable; V/Hz, variable with selectable profiles; Current limit, 50 to 110%.
 25. The VFD shall operate within the following parameters without the requirements for derating:
 26. Operating temperature, -10 C to +50 C;
 27. Humidity, non-condensing at any temperature.
 28. Audible noise over full operating range, no greater than 85 dB within 3 feet of motor.
 29. The inverter switching frequency should be variable so that it may be tuned to minimize motor noise.
 30. Standard enclosure shall be NEMA Type 1 design.
 31. The VFD shall meet the following standards:
 32. National Electric Manufacturer's Association (NEMA)

33. National Electrical Code (NEC)
34. The VFD shall be designed to meet the following specifications and operate within the following parameters.
35. The VFD's power circuit shall be fused and isolated internally with respect to ground. Fuses to be rated minimally at 200,000 amperes interrupting capacity.
36. The power unit's logic common shall be at ground potential.
37. Phase loss protection shall be provided to prevent single phasing.
38. The VFD shall be capable of continued operation during an intermittent loss of power for 0.1 seconds (6 cycles). Opening of the VFDs input and/or output line switches while operating shall not result in damage to the power circuit components.
39. The VFD shall have an instantaneous electronic trip circuit to protect the VFD from output line-to-line and line-to-ground short circuits. The VFD must be capable of withstanding short circuits at 480V plus 10% (528V). Use of isolation transformers for ground fault protection reduces system efficiency (4 to 5%) and will be weighted against designs where not required. The VFD supplier must demonstrate ground fault and short circuit protection at time of start up or plant witness test. The VFD shall be capable of providing 110% motor current intermittently. The VFD shall include an instantaneous over current trip. The VFD shall not restart after electronic overcurrent trip until reset through the run/stop circuit or unless the auto restart function has been enabled.
40. Transient and surge voltage protection shall be provided through use of Metal Oxide Varistors (MOVs) and phase-to-ground filter capacitors.
41. The VFD shall include an unattended start lock out circuit.
42. The drive system shall be manufactured by Cutler Hammer.
43. A complete description of suppliers Quality Assurance and Testing program shall be provided to the OWNER.
44. All VFDs shall be tested/run in the equivalent of NEMA 1 enclosure. The burn in shall be conducted for a minimum of four hours at rated ambient (40 C) with a fully loaded motor.
45. All power semiconductors and integrated circuits shall be 100% tested.
46. Computerized Automated Testing Equipment (ATE) testing shall be used to evaluate functional performance of printed circuit board. Printed circuit boards shall receive a thermal stress test where temperatures are cycled between 0 C and 65 C and receive electrical power-on the power-off cycle tests.
47. ADDITIONAL FEATURES:
48. An operator panel shall be provided that provides for easy program entry of parameters. One/two digital displays shall be provided to display speed, load, motor amps, and motor volts. All parameters shall be input digitally to the VFD. Mnemonic indication shall be provided. 8/16 LEDs shall be provided to indicate drive enabled, drive fault, and drive at base speed. LEDs shall be used to indicate selected functions. A remote mounting kit shall be furnished with the VFD.
49. Terminals shall be furnished to permit connection of a remote RUN-STOP selector switch furnished under this section. With the switch in the stop position, the motor shall be de-energized regardless of any other switch or contact position.
50. All operator controls and indicators shall be accessible without operator exposure to live parts.
51. The VFD shall have the following options:

52. Manual Speed Potentiometer (furnished loose for remote mounting)
53. Operator Panel with remote mounting kit
54. Hand-Off-Auto Switch (furnished loose for remote mounting, include legend plate)
 - d. The VFD shall be wall mounted on the top of the existing MCC just above the motor starter for pump no. 4. The operator panel shall be remotely mounted on the MCC below the existing main breaker disconnect for pump no. 4, with arrangement and design as specified herein. The existing main breaker for pump no. 4 shall remain and used as the main breaker for the new VFD.
 - e. The VFD shall be wired to the existing pump no. 4 motor leads.
 - f. The control wiring shall be terminated inside the MCC with terminal boards and then connected to the VFD.
 - g. The existing motor failure output wiring shall be connected to the new VFD fault circuit.
55. SIGNAL CONVERTER:
 1. A signal converter shall be provided to convert the existing wet well level pressure signal to a 4-20 milliamp output signal. The signal converter shall be calibrated as follows:

0-inches = 4 milliamps
150-inches = 20 milliamps
 2. The signal converter shall be mounted inside of the existing level control panel and connected to the existing bubbler tube system.
 3. The Contractor shall be responsible to connect the 4-20 milliamp output of the signal converter to the VFD using a 16 gauge single pair shielded cable.
 4. The signal converter shall be as manufactured by Devar, Bridgeport, CT, Modus Instruments, Foxboro Co., Foxboro, MA, or approved equal.

PART 3 – EXECUTION

3.01 FIELD ACCEPTANCE TESTS:

- A. The field acceptance test shall be performed by the VFD manufacturer's representative.
56. Amperage and voltage readings shall be taken within the VFD load at full load or a maximum load.
57. The VFD shall operate as the lead pump for a period of forty-eight (48) hours with no faults.
58. The VFD manufacturer's representative shall provide instructions on the proper operation of the VFD.

3.02 MANUFACTURER'S SERVICES

- A. The services of a factory trained manufacturer's representative shall be provided as specified herein.
- B. The manufacturer's on-site representative shall have the following minimum experience in installation of these products:
 59. Variable frequency drive system – 20 installations.

C. Services to be provided:

For variable speed drive systems, the service representative(s) shall be responsible for complete component inspection on site after delivery and shall assist in the correct assembly of the components for a minimum period of two (2) eight-hour days.

- 60. For inspection and check out of erected equipment.
- 61. For start-up services and supervision.
- 62. For complete instruction of the operating personnel.
- 63. The minimum period of time herein specified does not relieve the manufacturer from providing sufficient time to satisfactorily complete the required service functions.
- 64. The manufacturer's representative shall certify in writing that the variable speed drive has been properly installed.
- 65. The Owner reserves the right to videotape the instruction of the operating personnel for future use in training.
- 66. SPARE PARTS:
- 67. Fuse Kit – 3 of each size fuse
- 68. Power Module Kit – 1 phase of rectifying and inverting power devices
- 69. Operator keypad

END OF SECTION 16483